

Wear-Resistant Overlays for Pumps and Compressors

Problem

Reciprocating pumps and compressors are widely used in pipeline transportation, refining, chemical processing, coal gasification, polyethylene manufacturing and high-pressure cleaning operations. Rods and plungers in these pumps and compressors show accelerated wear in the packaging seal areas.

Wear is due primarily to the presence of the following conditions: corrosive environment, wet and dry particle abrasion, high pressures, high friction, temperature excursions and inadequate lubrication.

Solution

Praxair tungsten carbide overlays are applied in the packing seal area of rods and plungers by the exclusive detonation gun process. Praxair LW-1N30 and LW-3N30 tungsten carbide overlays are used to combat wear in non-corrosive environments and temperatures up to 1,000°F. LW-15 tungsten carbide overlays are used in corrosive environments.

Praxair overlays are used both to repair worn parts and to extend the wear life of new parts. In the case of worn parts, depending on operating environment and pressures, rods up to .030-inch undersize in diameter can be restored to original dimensions and, in most cases, provide significantly improved performance. On new parts, the overlay is applied .003 to .005 inches thick and is finished to blueprint specifications or as low as 2 Ra if required. Normally, no special lubricants or packing materials are needed.



Pump Plungers

Base metal temperature remains below 300°F during application of the overlay so that metallurgical properties of the parts are unaffected. No additional stress relieving or straightening is needed.

Results

Praxair tungsten carbide overlays extend the wear life of both new and restored compressor rods and pump plungers. Wear life increases are significant: Plungers in hyper-compressors in polyethylene manufacturing have run for 16,000 hours at 20,000 psi and showed only .001 inch of wear. Compressor piston rods have operated over five years in hydrogen service with the same carbon-filled Teflon® packing and showed no measurable wear in the packing area.

Praxair tungsten carbide overlays are also cost-effective. Downtime is saved, and rods and plungers need rework or replacement less often. When wear does eventually occur, parts can be overlaid again, further increasing the wear life of the same rods and plungers. Praxair tungsten carbide overlays have proven cost-effective in applications found in the following areas: Sour gas environments, synthesis gas and hydrogen services, ethylene and polyethylene processes, coal slurry pumping, coal gasification, oxygen services, nitrogen services, high-pressure water blasters and pipeline services.

Related Applications

Praxair tungsten carbide overlays have also been used effectively to extend the wear life of rotors shafts in turbines, centrifugal compressors and pumps.



Compressor Piston Rods

Typical Properties of D-Gun™ Applied Tungsten Carbide Overlays

	LW-1N30	LW-3N30	LW-15
Hardness, kg/mm ²	1150 HV	1125 HV	1000 HV
Maximum recommended Operating temperature	1,000° F	1,000° F	800° F



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